

**MONTANA FISH, WILDLIFE AND PARKS
FISHERIES DIVISION**

**ENVIRONMENTAL ASSESSMENT
CRAWFORD CREEK WESTSLOPE CUTTHROAT TROUT REHABILITATION**

PART I. PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Removal of non-native fish from Crawford Creek (Belt Creek drainage) above a constructed fish barrier using EPA registered piscicides containing rotenone and/or antimycin. After removal of non-native fishes, native westslope cutthroat trout (WCT: *Oncorhynchus clarkii lewisi*) above an upstream waterfall barrier will naturally repopulate the lower, treated reaches of stream.

B. Agency Authority for the Proposed Action: The Montana Fish, Wildlife & Parks (MFWP) "...is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects..." under statute 87-1-702. In addition, the overall goal of WCT management in Montana as stated in the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (MFWP 1999) is: "...to ensure the long-term, self sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana, and to maintain genetic diversity and life history strategies represented by the remaining local populations." The WCT Conservation Agreement was approved by the directors of three state agencies, four federal agencies, and two non-government organizations. The agreement lists five objectives to ensure the persistence of WCT in its native range in Montana. These objectives are:

1. Protect all genetically pure WCT populations
2. Protect introgressed (less than 10% introgressed) populations
3. Ensure the long-term persistence of the WCT within their native range
4. Provide technical information, administrative assistance, and financial resources to assure compliance with the listed objectives and encourage conservation of WCT
5. Design and implement an effective monitoring program by the year 2002 to document persistence and demonstrate progress towards goal

C. Estimated Commencement Date: August, 2006

Estimated Completion Date: October, 2007

Current Status of Project: A man-made concrete barrier was built near the mouth of Crawford Creek in 2005.

D. Name and Location of the Project: *Crawford Creek Westslope Cutthroat Trout Rehabilitation, Lewis and Clark National Forest.*

Crawford Creek is a small first order stream which enters Belt Creek 7.5 miles upstream of Monarch and 4.5 miles downstream of Neihart (Cascade County). The portion of stream (approximately 2.0 miles) to be treated is on Lewis and Clark National Forest between 46.9826°N, 110.8011°W and 47.0009°N, 110.7705°W. Upstream of the treatment area, between 0.5 and 1.5 miles of Crawford Creek lies on private property. The nearest private land on Belt Creek is 3.3 miles downstream from the confluence of Crawford and Belt creeks (Figure 1)

E. Project Size (acres affected)

1. Developed/residential - 0 acres
2. Industrial - 0 acres
3. Open Space/Woodlands/Recreation - 0 acres
4. Wetlands/Riparian – Approximately 2 miles of stream
5. Floodplain - 0 acres
6. Irrigated Cropland - 0 acres
7. Dry Cropland - 0 acres
8. Forestry - 0 acres
9. Rangeland - 0 acres (adjacent to grazing allotment on national forest lands).

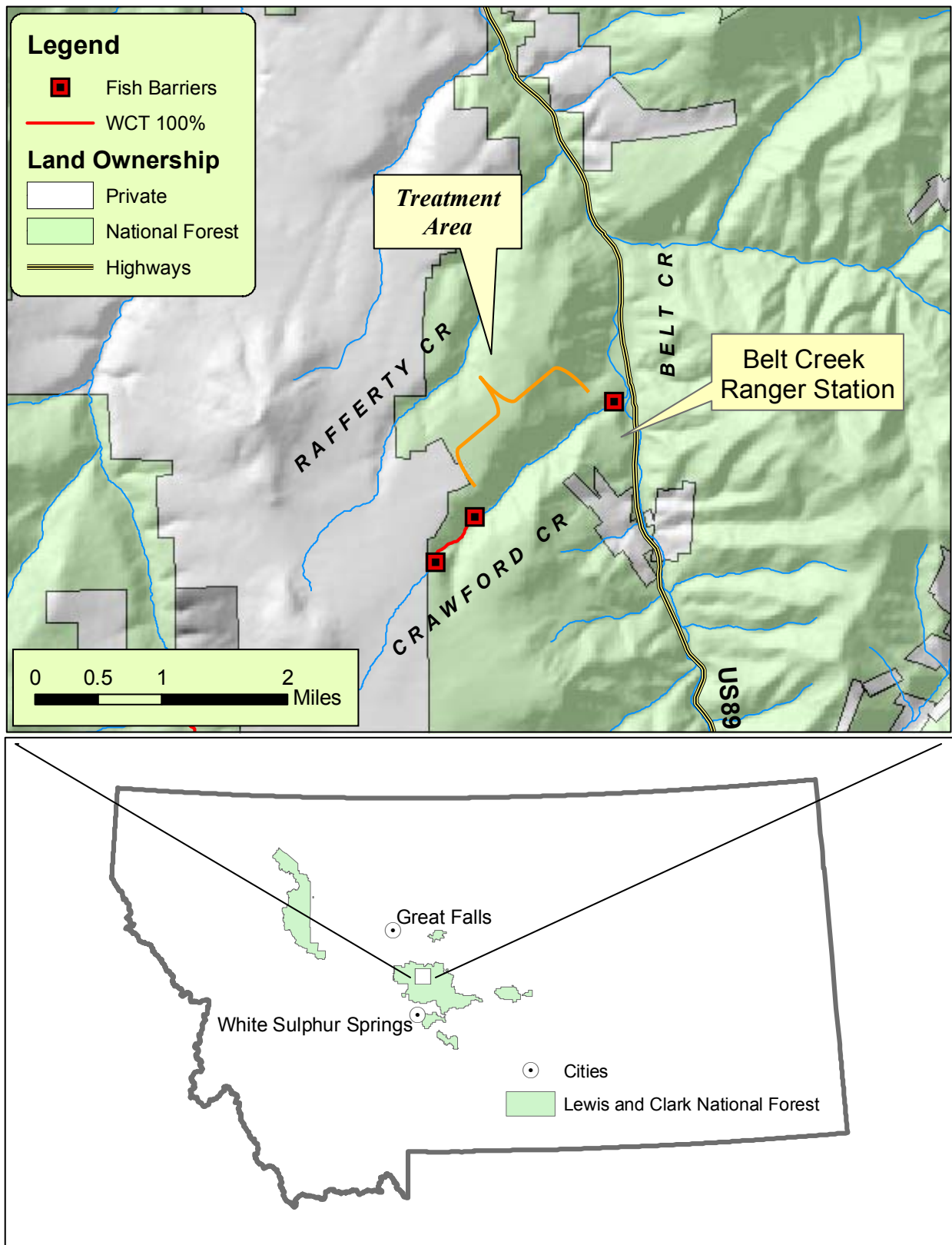


Figure 1. Crawford Creek and vicinity.

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

1. Summary of the Proposed Action:

Currently, the lower quarter mile of Crawford Creek-downstream of an old water diversion structure-supports mixed populations of rainbow trout (*Oncorhynchus mykiss*), westslope cutthroat trout, rainbow trout x westslope cutthroat trout hybrids, and brook trout (*Salvelinus fontinalis*). The next two miles (upstream) of stream support rainbow x westslope cutthroat trout hybrids and a few brook trout. The uppermost reaches of Crawford Creek (approximately 0.5 miles), above a natural waterfall barrier, supports a small pure population of westslope cutthroat trout. A new permanent barrier to upstream fish migration was constructed near the downstream end of Crawford Creek in 2005 (Figure 1). The proposed action involves removing non-native fishes from the 1.5 miles of stream between the natural upstream barrier and the recently constructed downstream barrier (Figure 1) using piscicides. Crawford Creek will then naturally be recolonized by genetically pure WCT drifting in from upstream areas.

Under this proposal, non-native fishes in Crawford Creek will be removed using EPA registered piscicides (rotenone: Prenfish™, CFT Legumine™, Prentox Cube Powder and/or antimycin: Fintrol™). Both antimycin and rotenone kill fish by blocking respiration at the cellular level. The Fintrol™ (antimycin) label recommends applying concentrations of 8 to 10 parts per billion (ppb) to eradicate trout. Rotenone may also be applied to the waters of the project area at concentrations of 0.5 to 5 parts per million (ppm) registered product. Antimycin will be used preferentially over rotenone unless conditions warrant the use of rotenone (e.g. high stream pH, low efficacy of Fintrol™ during bioassays, or need for use of a powdered rotenone formulation in springs and seeps).

Treatment using Fintrol™ (antimycin) will involve placement of drip stations (5-gallon buckets dripping a constant amount of piscicide over a period of time, generally 4 to 8 hrs) at intervals of 200 to 400 ft. The interval will depend on water speed in the stream as well as results of bioassays. Bioassays will be conducted a day or two prior to initiating treatment, and will involve testing the efficacy (ability to kill fish) of Fintrol™ at various distances downstream from a single drip station. If conditions warrant its use over antimycin, treatment using rotenone (Prenfish™ or CFT Legumine™) will involve placing drip stations at intervals of between 0.25 miles to 1 mile (i.e. 8 to 2 drip stations in Crawford Creek). The interval will depend on water speed in the stream as well as results of bioassays. Backpack sprayers will be used in areas of standing water and in springs and seeps on the stream margins. The project will likely occur during late summer or early fall of 2006 or 2007. At least two treatments will be necessary to ensure complete eradication of non-native fishes. The second treatment will be initiated after the antimycin or rotenone naturally detoxifies and remaining fish have returned to typical holding areas of the stream (i.e. pools) from stream margins, springs, and seeps. Antimycin degrades quickly in streams and typically persists for less than seven days, while rotenone typically degrades within 14 days. To prevent unnecessary mortality of pure WCT, we will install a block net to keep pure WCT in upstream reaches from moving downstream into the treatment zone. Piscicides will be neutralized after passage over the constructed barrier by application of potassium permanganate at 1-6 ppm. The concentration of potassium permanganate necessary for neutralization will be determined through bioassays completed prior to treatment according to piscicide label recommendations.

2. Purpose and Need for the Proposed Action:

The westslope cutthroat trout is ranked as S2 (imperiled because of rarity or because of other factors demonstrably making it very vulnerable to extinction throughout its range) by the Natural Heritage Network and the State of Montana. Genetically pure WCT are thought to occupy about 8% of their historical range in the western United States (Shepard et al. 2003) and less than 3% of their historical range in northcentral Montana within the Missouri River Drainage (Moser et al. 2004). Current survey and inventory work has documented about 37 stream miles and 14 populations of pure WCT in the Belt Creek Drainage (Moser et al. 2004). Major threats to WCT include competition and hybridization with non-native rainbow trout (Leary et al. 1995; Hitt et al. 2003), competition with brook trout (Dunham 2002; Peterson et al. 2004), and isolation of remaining pure populations above barriers in short headwater sections of stream. These small isolated populations are at risk of extinction from catastrophic events (e.g. fire, drought) and may eventually suffer negative consequences of genetic inbreeding (Wang et al. 2002).

Projects which restore WCT to historically occupied habitats are necessary to ensure the continued survival of WCT in the Belt Creek drainage and elsewhere. In addition, efforts to stabilize and buoy WCT populations will help prevent future listing of WCT under the Endangered Species Act. This proposed action will protect and expand the WCT

population in Crawford Creek from less than 1/2 miles to over 2 miles of inhabited stream. The resulting increase in population size should reduce risks of extinction by reducing negative impacts from inbreeding depression (loss of fitness) and the potential impacts of catastrophic events (e.g. fire, drought). It is unlikely that this short reach of stream could support the 2,500 minimum WCT population size recommended by Hilderbrand and Kershner (2000) for long term persistence and it drains less than the 5.6 square miles (minimum watershed size) area recommended as a coarse filter for translocations by Harig and Fausch (2002). However, the habitat is better than that found in many WCT streams in northcentral Montana that have held WCT populations for greater than 50 years (Tews et al. 2000).

3. Benefits of the Project:

This project is intended to increase the amount of stream occupied by genetically pure WCT (an increase of approximately 5.5 percent in the Belt Creek Drainage). If implemented, this project would protect and expand a unique pure population of westslope cutthroat trout and lower the overall risk of extinction of westslope cutthroat trout in the Belt Creek Drainage. This project would also help achieve the goal and objectives listed in the statewide Conservation Agreement (1999) for the restoration of westslope cutthroat trout. Projects which restore WCT to their historical habitat will help prevent future listing under the Endangered Species Act and potential imposition of federal regulatory restrictions. This project will also provide a unique opportunity for anglers to fish for native trout in an accessible area of Lewis and Clark National Forest.

G. Other Local, State, or Federal agencies with overlapping jurisdiction

Montana Department of Environmental Quality is responsible for exempting surface water quality standards for pesticide use (Section 308 of the Montana Water quality Act, MCA 75-5-308).

Montana Department of Agriculture is responsible for regulating the use of pesticides within the state of Montana. (applicators licensed by this agency will be conducting the operation).

H. Agencies Consulted During the Preparation of the EA

Montana Fish, Wildlife & Parks – Helena, Great Falls

Montana Department of Environmental Quality is responsible for exempting surface water quality standards for pesticide use (Section 308 of the Montana Water quality Act, MCA 75-5-308)

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. <u>LAND RESOURCES</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?		X				
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		X				
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

2. WATER	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		NO	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of floodwater or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		YES	See 2a and 2f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		YES	5c
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		NO	see 2a

Comment 2a: The proposed project involves application of EPA (Environmental Protection Agency) registered piscicides to Crawford Creek to remove non-native fish. Antimycin will be introduced to Crawford Creek at a concentration of 8 to 10 ppb (23% formulation of Fintrol™), or possibly a rotenone formulation at a concentration of 0.25 to a maximum of 5.0 ppm (5% formulation of Prenfish™/CFT Legumine™), as well as potassium permanganate (KMnO₄) at a concentration of 1 to 6 ppm as a means to deactivate antimycin and rotenone. All piscicides kill through biochemical processes at the cellular level which make it impossible for the fish to use oxygen absorbed in the blood and needed in the release of energy during respiration (Oberg 1967a, 1967b).

Antimycin is a compound isolated from the bacterium *Streptomyces griseus*. Antimycin was discovered in 1945 and found to be highly toxic to fish in 1963. Antimycin was first registered as a piscicide in 1964. Antimycin breaks down rapidly in the environment, normally persisting less than 7 days (Walker et al. 1964; Marking and Dawson 1975; Schnick 1974a). Moreover, its breakdown products are non-toxic (Herr et al. 1967). The label for Fintrol™, the current commercial formulation of antimycin, states that once diluted in water, Fintrol™ must be used within eight hours to ensure its potency, and that treated waters may usually be restocked within one week following treatment. Fintrol™ is applied using backpack sprayers and drip buckets.

Rotenone is a naturally occurring substance derived from the roots of several tropical and sub-tropical plants in the bean family, Leguminosae, including jewel vine or Flame tree (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) and hoary pea (*Tephrosia* spp.) (Finlayson et al. 2000). We plan on using a liquid formulation (Prenfish™ or CFT Legumine™) that is extracted from the roots for drip stations and backpack sprayers. The powdered form of rotenone (Prentox; 5%

formulation) may be mixed with gelatin and sand and placed in seeps and backwater areas of the stream. Rotenone (Prenfish™ or CFT Legumine™) also breaks down rapidly, though less rapidly than antimycin. The label for Prenfish™, one of several commercial formulations of rotenone, states that rotenone will detoxify under natural conditions within one week to one month depending on temperature, alkalinity, etc. The time for natural degradation (neutralization) of rotenone is controlled primarily by temperature. Rotenone acts and degrades faster in warmer water (Horton 1997). In California, studies have shown that rotenone completely degrades within 1-8 weeks within the temperature range of 50-68F (10-20C) (CDFG 1994; Siepmann and Finlayson 1999). The aforementioned studies monitored breakdown of rotenone in standing waters. In running waters, rotenone will break down more rapidly because of hydrolysis (breakdown through reaction with water) and photolysis (breakdown by sunlight). In addition, rotenone dissipates in flowing water quickly as a result of dilution; in this case addition of water in the form of springs and seeps and dilution of Crawford Creek as it enters Belt Creek (Cheng et al. 1972; Biosherics 1982; Finlayson et al. 2000). Belt Creek has more than 20 times the discharge of Crawford Creek. Any rotenone that is not neutralized by potassium permanganate will be very rapidly diluted in Belt Creek and pose little risk to fishes, humans, or livestock beyond the immediate mixing area.

To help ensure that aquatic life and water quality downstream of Crawford Creek will not be affected, rotenone and/or antimycin will be detoxified with potassium permanganate shortly after it passes the man-made concrete barrier (located 0.2 miles upstream from the confluence with Belt Creek). Potassium permanganate has long been used for various applications in fish culture including as a control for external parasites (Lay 1971), and for detoxification of antimycin (Marking and Bills 1975) and rotenone (Lawrence 1956). However, potassium permanganate itself is toxic to fish if concentrations are too high. The toxicity of potassium permanganate to fish is dependent on the particular chemistry of the water in question. Surface waters have a potassium permanganate demand based on the amount of organic materials in the water. Successful use of potassium permanganate to detoxify antimycin and rotenone is based on balancing the amount of potassium permanganate with the natural chemical demand of the water and the chemical demand caused by antimycin or rotenone.

To determine the optimal concentration (from one to six parts per million) of potassium permanganate, bioassays will be performed with resident trout and water in Crawford Creek prior to treatment with toxicants. These bioassays will be used to determine the amount of potassium permanganate needed to overcome the water's potassium permanganate demand, neutralize the fish toxicants, and not kill fish. When the optimal concentration has been determined, a detoxification station will be set up to dispense this concentration of potassium permanganate at the downstream end of the treatment section. Water will be detoxified until sentinel fish downstream of the station survive for 24 hours in the case of antimycin (*from* Fintrol™ label) or show no signs of stress after four hours in the case of rotenone (*from* Prenfish™ label).

The concentration of rotenone (1-5 ppm of a 5% rotenone formulation, or 0.05-0.25 ppm pure rotenone) which will be used in this project will not be harmful to plants, most invertebrate populations, adult amphibians, reptiles, birds, or mammals, including humans, from exposure to treated water, drinking of treated water, or ingestion of treated fish. Substantial research has been conducted to determine the human health threats of rotenone. From this research it has been concluded that rotenone does not cause birth defects (Hazleton Raltech Laboratories 1982), reproductive dysfunction (Spencer and Sing 1982), gene mutation (Biotech Research 1981; Goethem et al. 1981; NAS 1983), or cancer (USEPA 1981; Tisdell 1985). Bioassays on mammals indicate that at the proposed concentrations, antimycin and rotenone will have no effect on mammals, including humans that drink the treated water (Schnick 1974a; Schnick 1974b; Herr et al. 1974). The hazard associated with the short-term exposure to drinking water containing rotenone is very small because of the low concentration of rotenone used in the treatment and the rapid breakdown and dilution of rotenone. Estimates of a single lethal dose to humans are 300-500 mg of rotenone per kilogram (2.2 pounds) of body weight (Gleason et al. 1969). For example, a 160 pound (72.6 kilogram) person would have to drink over 23,000 gallons (87,000 liters) of water treated at 0.25 mg of rotenone per liter of water at one sitting; 0.25 mg of rotenone per liter of water is the highest allowable treatment rate for fish management.

There are no Federal or Montana numeric water quality standards for rotenone. However, BPA (Bonneville Power Administration; 2004) used the EPA method of calculating the safe level for life long (70 years) consumption of water (2 L/day) to be 0.140 ppm rotenone (0.140mg/L). Thus, the proposed treatment level of 0.05 ppm active rotenone is 2.8 times lower than the level deemed acceptable for daily consumption for 70 years.

There are no Federal or Montana numeric water quality standards for antimycin. However, BPA (2004) used the EPA method for calculating the safe level for sub-chronic (daily oral exposure for 10% of average human lifespan) consumption of water (2 L/day) to be 10 ppb (10 ug/L) antimycin. An antimycin concentration of 10 ppb is slightly

higher than the level (8 ppb) to be used in this project. Antimycin degrades rapidly and concentrations will fall below the 8 ppb level within one week of application. Moreover, when exposed to direct sunlight and turbulent stream conditions found in this project-antimycin will break down much more rapidly (potentially hours).

The product label for Prenfish™ (rotenone) requires that water intakes within a mile of the treatment be shut down during treatment and detoxification. The product label for Fintrol™ (antimycin) recommends that treated water not be used for drinking. During treatment, access to the treatment area will be restricted to USFS employees and project personnel. In addition, signs will be posted at areas of entry warning that the treatment is taking place and water should not be used for drinking. Detoxification measures and distance traveled (0.2 miles) will effectively contain and dilute the compounds before they reach Belt Creek. Treated Crawford Creek water will undergo a 10 to 20 fold dilution when it enters Belt Creek. Potassium permanganate (the neutralizing agent) breaks down rapidly in the environment and its toxicity will be reduced or eliminated through oxidation of its organic components with antimycin or rotenone (Finlayson et al. 2000). The level of manganese (BPA 2004) determined to be safe assuming a 70 kg person is drinking 2 L/day of affected water is 0.8 ppm (0.8 mg/L). This level of manganese is equivalent to 2.3 mg/L potassium permanganate. Since our guidance is to maintain 1ppm (1 mg/L) potassium permanganate at the lower end of the detoxification zone, anyone drinking water from Crawford Creek below this point would be safe. Furthermore, anyone drinking from Belt Creek below the confluence would experience levels 10 to 20 times less than 1 mg/L of potassium permanganate because of dilution.

To reduce the potential risks associated with the use of rotenone and antimycin, the following mitigation measures and monitoring efforts will be employed:

1. A pre-treatment bioassay will be conducted to determine the lowest effective concentration and proper spacing of drip stations.
2. Project personnel will be trained to safely use these chemicals including the actions necessary to deal with spills. Personnel will use the proper Personal Protective Equipment (PPE), wear rubber gloves, safety goggles, respirators, and will follow directions on product labels.
3. Only the amount of rotenone or antimycin that is needed for immediate use will be held near the stream.
4. Prior to the use of the chemicals, USFS personnel will be notified and signs will be posted at access areas. Signs will include information on the project, the chemicals to be used, and precautions.
5. Sentinel fish will be used within the project area to determine and monitor the effectiveness of the treatment and the effectiveness of the neutralization.

Comment 2f: Changes in groundwater quality: The risk that rotenone will enter and be mobile in groundwater is minimal. The ability of rotenone to move through soil is low to slight (Finlayson et al. 2000). Rotenone moves less than one inch in most types of soils, except for sandy soils where the movement is slightly more than three inches. Rotenone is strongly bound to organic matter in soil, so it is unlikely that rotenone would enter the groundwater (Dawson et al. 1991). Furthermore, any rotenone that enters groundwater will continue to be diluted by water already present in the aquifer. The chance for exposure to rotenone from groundwater in this application is minimal since the domestic well for Belt Creek Ranger Station is upstream and on the opposite side of Belt Creek from Crawford Creek. In addition, sampling by MFWP personnel in domestic wells closely associated with lake treatments have failed to find rotenone or any inert products of rotenone formulations (Don Skaar; personal communication). Risks associated with antimycin and groundwater would be less than rotenone. Antimycin movement in groundwater is not expected either because it also binds with organic matter, it will be used in lower concentrations than rotenone and it degrades faster than rotenone. Potassium permanganate (the neutralizing agent) breaks down rapidly in the environment and its toxicity will be reduced or eliminated through oxidation of its organic components with antimycin or rotenone (Finlayson et al. 2000).

3. <u>AIR</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))		X				
b. Creation of objectionable odors?			X		NO	3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				

d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge, which will conflict with federal or state air quality regulations?		X				

Comment 3b: Formulated rotenone has aromatic solvents that can be construed as objectionable. Antimycin has acetone as a constituent element. Odors associated with these compounds will dissipate rapidly, and any impacts to air quality will be short term and minor. Also, applicators are required to use NIOSH respirators for both antimycin and rotenone specifically due to these hazards. There may be some odor from decomposing fish for a short time after treatment.

4. VEGETATION	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?		X				
b. Alteration of a plant community?			X			4a
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: Some trampling of vegetation may occur along the stream corridor. Impacts will be minor and short term.

5. FISH/WILDLIFE	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		NO	5b
c. Changes in the diversity or abundance of non-game species?			X		YES	5c
d. Introduction of new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?		X				
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				

i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				
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Comment 5b: This project involves killing non-native fishes in Crawford Creek, specifically rainbow trout, WCT hybrids, and brook trout. After completion of the project, the treated reach will naturally recolonize with pure WCT from upstream reaches of Crawford Creek. The bulk of recolonization will likely occur within 5 years of treatment. During recolonization numbers of fish in the treated reach will be lower than pre-project levels.

Comment 5c:

Aquatic Invertebrates. Most studies have found that at proposed application levels, antimycin does not pose a threat to most aquatic invertebrate populations found in streams and standing waters (Walker et al. 1964; Schnick 1974a; Houf and Campbell 1977). The Fintrol™ (antimycin) Use Direction Leaflet states that it causes no apparent harm to plants, aquatic insects or bottom fauna. However, certain invertebrates will probably be affected at the proposed application levels of antimycin, including Cladocera and Copepoda (zooplankton), Amphipoda (scuds), and certain mayflies and caddisflies, although populations of these taxa are only diminished temporarily (Schnick 1974a). Numbers of these invertebrates may decline temporarily after treatment but should rapidly recolonize from upstream and downstream sources. A study in a Wisconsin trout stream did find temporary reductions in aquatic invertebrates including certain caddisflies, a crane fly, a mayfly and a scud (Jacobi and Degan 1977). However, concentrations of antimycin in this stream reached as high as 44 parts per billion, about 4 times higher than the proposed concentration for this project (*from* Bramblett 1998).

In general, most studies report that aquatic invertebrates, except zooplankton are much less sensitive to rotenone treatment than fish (Schnick 1974b). One study reported that no significant reduction in aquatic invertebrates was observed due to the effects of rotenone, which was applied at levels twice as high as the levels proposed for this project (Houf and Campbell 1977). In all cases, the reduction of aquatic invertebrates was temporary, and most treatments used a higher concentration of rotenone than proposed for this project (Schnick 1974b). In a study on the relative tolerance of different types of aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization. The authors of this study also suggest that it is probable that in most streams, only mild and temporary damage to aquatic invertebrates would occur in treatments using rotenone at levels ten times higher than the levels proposed for this project (*from* Bramblett 1998).

Because of their short life cycles (Anderson and Wallace 1984), good dispersal ability (Pennack 1989) and generally high reproductive potential (Anderson and Wallace 1984), aquatic invertebrates are capable of rapid recovery from disturbance (Jacobi and Deegan 1977; Boulton et al. 1992; Matthaei et al. 1996). Headwater reaches of Crawford Creek will not be treated with fish toxicants and will provide a source of aquatic invertebrate colonists. In addition, recolonization will include aerially dispersing invertebrates from downstream areas of Belt Creek (e.g. mayflies, caddisflies).

Amphibians:

Amphibian species which may be present on the project area are Columbia spotted frogs (*Rana luteiventris*), boreal toads (*Bufo boreas*), boreal chorus frogs (*Pseudacris maculata*), and tiger salamanders (*Ambystoma tigrinum*).

All of the amphibian species that could be present in the project area prefer to breed in the standing water of ponds, rather than in streams. The areas where rotenone use is proposed in this project are primarily running water. Also, most amphibian larvae (tadpoles) will have already undergone metamorphosis to the less vulnerable adult stage by late summer when the proposed stream treatment will occur.

Reports in the literature indicate that antimycin has no effect on amphibians at the proposed concentrations of 8 to 10 ppb (Walker 1964; Schnick 1974a). For example, tiger salamanders survived exposure at 80 ppb for 96 hours, while bullfrog tadpoles survived 20 ppb, but perished when exposed to 40 ppb for 24 hours (Walker 1964). The LC50 (lethal concentration at which 50% of tested organisms die) for leopard frogs was from 48 to 59 ppb in water of varying hardness (Schnick 1974a). Grisak (2003) found no effect levels for adult spotted frogs of 60 ppb Fintrol™ (antimycin) and for long-toed salamander larvae of 15 ppb Fintrol™.

Rotenone can be toxic to some gill-breathing larval amphibians, but is not harmful to adults (Schnick 1974b), except tiger salamanders (Schnick 1974b). Grisak (2003) found a no effect level for adult spotted frogs of 4.5 ppm Preenfish™ (rotenone). A no effect level was found for long toed salamander adults of <3.5 ppm Preenfish™ (rotenone).

Reptiles: Western terrestrial garter snake (*Thamnophis elegans*) is the only reptile known to occur in the project area, but it is not aquatic and will not likely be affected by this action.

Birds and Mammals: Birds and mammals in the project area may be exposed to antimycin or rotenone through direct exposure, drinking of toxicant-treated water, or by eating fish killed by fish toxicants. Bioassays indicate that, at the proposed concentrations antimycin and rotenone will have no effect on mammals, including humans that drink the treated water (Schnick 1974a, 1974b; Herr et al. 1967). Schnick's (1974a) review included studies that examined direct exposure to water and eating fish killed by antimycin. In addition, she reported on toxicology studies that calculated the LD50 (dose at which 50% of tested individuals die) with direct feeding of antimycin to birds and mammals. LD50's for birds and mammals were in the range of parts per million, which is at least one thousand times higher than the proposed concentrations on this project. However, the product label for the commercial form of antimycin (Fintrol™), recommends that treated water not be used for drinking. Studies conducted to set tolerances for rotenone use in irrigation waters, livestock areas, and recreational swimming areas suggest that the proposed concentrations of rotenone in this project would have no effect on mammals (including humans) that drink the treated water. Moreover, rotenone was used for many years to control grubs on the backs of dairy and beef cattle. The product label for a commercial form of rotenone (Preenfish™) prohibits its release within ½ mile upstream of a potable or irrigation water intake. Horses will be pastured elsewhere and treatments will be timed when USFS grazing allotments are seasonally unoccupied. In addition, the public will be restricted from entering treated waters until sentinel fish survive for 48 hours.

Summary of effects on nongame species: It is expected that impacts on all non-game species will be minor and/or temporary.

Mitigation: Prior to treatment the project area will be surveyed at likely amphibian breeding locations using Montana Natural Heritage Program protocols. If no individuals of species found in the pre-treatment surveys are found in post-treatment surveys; then populations will be re-established from neighboring areas.

B. HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Increases in existing noise levels?		X				
b. Exposure of people to severe or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

7. LAND USE	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose			X			7c

presence would constrain or potentially prohibit the proposed action?						
d. Adverse effects on or relocation of residences?		X				

Comment 7c: Treatments will be timed so that livestock grazing allotments adjacent to the proposed treatment area are unoccupied. If this is not possible, every effort will be made to work with allottees to minimize exposure of livestock to treated waters (e.g. temporary movement to adjacent pastures, etc.)

8. RISK/HEALTH HAZARDS	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?		X				
c. Creation of any human health hazard or potential hazard?			X		YES	see 8a
d. Will any chemical toxicants be used?			X		YES	see 8a

Comment 8a: There is a minor risk of spilling antimycin, rotenone or potassium permanganate directly into the stream. Antimycin, rotenone and potassium permanganate are normally diluted in water first and then dripped into the stream at a constant rate by using a device that maintains a constant head pressure, called a “drip station”. If undiluted antimycin, rotenone or potassium permanganate is spilled, or if a drip station tips into the stream, a higher concentration of chemical in the stream will result. This increase in concentration of piscicide will likely be short term and will dissipate rapidly as soon as the stream enters and is diluted by Belt Creek. Short-term increases in concentration of toxicant should not affect rates of application of potassium permanganate downstream of the man-made barrier. Moreover, sentinel fish downstream of the detoxification station will be monitored and permanganate levels adjusted as necessary.

There is a minor risk of a health hazard for project personnel associated with eye or skin contact with undiluted Fintrol™, the commercial formulation of antimycin. There is also a minor risk of a health hazard for project personnel associated with eye or skin contact with the commercial formulation of rotenone (Prenfish™, CFT Legumine™). There is a significant health hazard for project personnel associated with inhalation or swallowing of undiluted rotenone. Personnel will be trained in the proper use of piscicides by a licensed pesticide applicator. Personnel will wear the proper Personal Protective Equipment (e.g. respirators, goggles) and follow all procedures specified on Piscicide Use Labels and Material Safety Data Sheets (MSDS).

Project personnel will be provided with MSDS for piscicides and neutralizing agents used in this project. Eyewash bottles will be available for personnel operating drip stations and working with chemicals. All applicators will have handheld radios. Risks to applicators are substantially greater than risks to the general public because of the necessity of handling the compounds at full strength.

A commercial formulation of rotenone similar to that proposed for use in this project contains volatile organic compounds (xylene, trichlorethylene (TCE), toluene, and trimethylbenzene), and semi-volatile organic compounds (naphthalene, 1-methyl naphthalene and 2-methyl naphthalene). The organic compounds disappear before rotenone dissipates, typically within 1-3 weeks (Finlayson et al. 2000). The volatile organic compounds don’t accumulate in the sediment; naphthalene and methyl naphthalene accumulate temporarily in the sediments (CDFG 1994; Siepmann and Finlayson 1999). TCE (a carcinogen) concentrations are expected to be within drinking water standard levels immediately following treatment. None of these constituents will be present at levels that can be expected to have any effect on animal life.

Fintrol™ (antimycin) contains acetone, diethyl phthalate, and nonoxynol-9. Acetone vaporizes or is broken down by soil and stream water microorganisms. Diethyl phthalate is also broken down by soil and stream water microorganisms. Nonoxynol-9 is a commonly used detergent and spermicide. The volume of Fintrol™ product used is very low and once diluted for application and diluted by running water poses little risk to humans.

Other potential effects of antimycin and rotenone including effects of diluted product and long-term impacts are discussed in Section 2a of this EA.

9. COMMUNITY IMPACT	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. PUBLIC SERVICES/TAXES/UTILITIES	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _____		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				
f. Define projected maintenance costs		X				

11. AESTHETICS/RECREATION	IMPACT	None	Minor	Potentially	Can	Comment
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	Unknown			Significant	Impact Be Mitigated	Index
Will the proposed action result in:						
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)		X				
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

12. CULTURAL/HISTORICAL RESOURCES	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Destruction or alteration of any site, structure or object of prehistoric historic or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				
d. Will the project affect historic or cultural resources?			X			

Comment 12d: This project will help preserve westslope cutthroat trout, the State Fish of Montana and the only trout native to the upper Missouri River.

13. SUMMARY EVALUATION OF SIGNIFICANCE	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action, considered as a whole:						
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources, which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or			X			13e

controversy about the nature of the impacts that would be created?						
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)			X			See 13e
g. List any federal or state permits required.						13g

Comment 13e: We do not expect this project to generate substantial controversy. However, to mitigate the potential controversy associated with the use of piscicides or any other aspect of this project, MFWP will inform the interested public and discuss the proposed project with landowners prior to treatment.

Comment 13g: The following list of permits will be required:

- DEQ 308 – Montana Department of Environmental Quality (authorization for use of a piscicide)
- A Montana Department of Agriculture certified applicator will be present during all treatments.

PART III. ALTERNATIVES

Three alternatives were considered during preparation of the Environmental Assessment.

Alternative 1 - No Action.

The "No Action" alternative would result in not treating Crawford Creek and maintaining the status quo management. Currently, the concrete fish barrier is blocking upstream movement of non-native fishes and should slow down rates and extent of hybridization in Crawford Creek. However, hybridization in lower Crawford Creek is already extensive and the majority of the fish population upstream of the barrier is probably a hybrid swarm (all individuals hybridized to some extent). The "No Action" alternative does not protect or restore WCT in the majority of Crawford Creek and fails to fulfill the purpose of the constructed fish barrier.

Alternative 2 - Proposed Action

The proposed action includes removing the existing fish populations in Crawford Creek between 46.9826°N, 110.8011°W and 47.0009°N, 110.7705°W.

The predicted benefits of Alternative 2 include:

- Increase in total miles of WCT inhabited stream in the Belt Creek drainage from 37 to 39 miles (5% increase).
- Protection and increase in robustness of current pure WCT population in the headwaters of Crawford Creek.
- This project supports the overall goal of WCT management in Montana as stated in the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (MFWP 1999) is: "...to ensure the long-term, self sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana, and to maintain genetic diversity and life history strategies represented by the remaining local populations."
- Projects like this help prevent future listing of WCT under the Endangered Species Act.

Alternative 3 - Mechanical Removal

Removal of fish from Crawford Creek could potentially be accomplished using backpack electrofishing equipment. Complete removal of fishes using backpack electrofishing equipment may be impossible and would at least require years of repeated efforts. Electrofishing is far more labor intensive and costly than application of piscicides. In addition, with a constant influx of upstream fish that may be mistaken for hybrids, certainty in elimination of all non-native fishes will be low and many pure WCT will be sacrificed.

PART IV. ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

A) Is an EIS required? No

This environmental review demonstrates that the impacts of this proposed project are not significant. The proposed action would benefit westslope cutthroat trout in the Belt Creek drainage with minimal impact on the physical, biological, or the human environment.

B) Public Involvement.

This EA will be posted on the MFWP internet site (<http://fwp.mt.gov/publicnotices/>), and mailed directly to interested persons. Any interested citizen will be encouraged to contact MFWP to discuss the proposal.

C) Duration of the comment period?

The comment period is 30 days. Public comment will be accepted through June 30, 2006

D) Name, title, address, and telephone number of the Person Responsible for Preparing the EA Document.

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